

THE CANADIAN TUCKAHOE

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(WITH PLATES 7-9)

During some eight years past there have been received and examined, from the wooded regions (principally poplar woods) of the provinces of Manitoba and Saskatchewan, a number of large fungous sclerotia, such as one finds occasionally referred to in literature. Nearly all these references are sufficiently definite in showing that sclerotia similar to those under examination here have been frequently enough observed, but all records are as cautious as they are meager in supplying critical information relating to the classification of these sclerotia.

Of the twenty and more specimens seen from time to time, it may be said that they agree in character, appearance and composition, and no doubt are all identical.

They ranged from the size of a hen's egg to that of a cocoanut still within its fibrous covering. The largest specimen seen by us was an oval body and measured when fresh 22 inches by 33½ inches in circumference; its weight was 8 lbs. 4 ozs. After several years' drying, this sclerotium was reduced in size to 20 inches by 29 inches, and in weight to 6 lbs. 13 ozs.

On arrival and while still fresh, these masses bounce like a solid rubber ball, though not quite as readily. The exterior is coal black, not glossy but quite mat. They often contain a number of small stones; in one case one as large as a hen's egg was more than three quarters firmly embedded. Generally there were exhibited grooves resulting from enclosed roots, which in most cases, however, had rotted away. One of these grooves is plainly shown in the left-hand specimen of Plate 7. The external structure is not very definite, showing merely minute irregular fissures.

In cutting through a specimen, the knife frequently strikes embedded grains of sand and small stones. The crust of the

sclerotium differs in color perceptibly from the interior. There is a pronounced coal-black layer readily distinguished from the interior substance. The bark seems structureless in our specimens; on microscopical examination one finds but the debris of what might have been originally specialized hyphae.

The interior is blackish olive green, particularly when fresh, becoming more grayish black when dry, but its appearance on the whole is black, interspaced with many small crevices which are filled with dirty, white, very tough masses of hyphae. This gives the interior a mottled, marble-like effect. (Plate 7, center.)

Microscopically examined, the hyphae are of very irregular thickness. They are thick-walled and show numerous curious hooks and clamps and an occasional anastomosis. (Plate 9 *A.*)

The darker substance, which resembles rubber, evidently also consists of hyphae, considerably thicker and almost solid when moistened. The difference in size between the hyphae composing the light and dark masses, is plainly shown in our attempt to interpret the interior structure of these sclerotia. (Plate 9 *B.*)

When thoroughly dry, the sclerotia became as hard as stone and once they had dried out would not produce any fruiting bodies, but merely decomposed when buried in the soil.

The habitat of these sclerotia is invariably among the roots of poplar woods. They are found generally after land has been cleared and the ground backset afterwards by the plough. Correspondents frequently report having seen them attached to roots. This has given rise to the statement that they might be parasitic. The wood to which the sclerotia are attached is filled with hyphae, but we have no first-hand evidence that they derive more benefit from being attached to a root—although there exists such probability—than from the stones with which they are often intimately associated.

The next striking statement is that these bodies are edible, but we ourselves could not exert any marked effect on them with our teeth, though in the interests of mycophagists we tried them raw and cooked. Cooked, they became slightly jellified, but a jelly itself was not produced.

The late James Fletcher (1) gave a preliminary account of his

observations with what we are confident were sclerotia similar to our own. Dr. Fletcher planted some of these sclerotia in 1906, and a year later he had the great satisfaction of finding two fleshy "toadstools" growing from the sclerotia, which he stated he had so far not identified. He gave a very brief description of the fungi, and referred them to the genus *Polyporus*. The photographs which accompany his note unfortunately show nothing beyond the fact that the sclerotia produced fruiting bodies. Similar success attached to some specimens of the same consignment which Professor Thaxter planted. His, also, after being planted two years, yielded a fruiting body, a form of *Polyporus*, which he turned over to Dr. Farlow.

Dr. Farlow mentioned in this connection a popular article by J. H. Gore (2) dealing with a Southern Tuckahoe or "Indian Bread." The fungus dealt with by Gore is obviously not the same as ours.

Some time ago, on August 1, 1914, we planted a sclerotium recently received, and in splendid condition, which produced ten months later a fruiting body. The sclerotium in question weighed about 13 ozs. and came from Manitoba, where it had been dug up in a field formerly a poplar bush; it was planted in a nine-inch flower pot about three inches below the soil surface and the pot was embedded in the ground outdoors. Towards the beginning of June, 1915, we observed a small fungus body developing. This grew to the size of a filbert and then died. A few days later another more vigorous fruiting body made its appearance, but so close to the edge of the pot that we feared its shape would be affected. So far as we could observe without disturbing the specimen, the margin of the cap was but slightly incurved. Towards the end of June the sporophore had matured, and began shedding large masses of white spores (Pláte 8).

The cap was almost sessile, the stem proper being only about half an inch above ground.

The surface of the cap measured 5 inches by 3½ inches. The pileus was thick, soft fleshy, like cheese in texture, and irregularly lobed, with one particular prominent imbricate lobe. This made the stipe appear almost eccentric. The pileus was at first hemi-

spheric to convex, but later became plano-convex with slightly upturned margin, exposing the tubes of the hymenium. The surface was dry, soft and silky to the touch. The flesh was thick in the center, whereas the margin or edge was decidedly thin, only about $\frac{1}{16}$ of an inch, whilst the tubes towards the edge were nearly $\frac{1}{4}$ of an inch in length.

The color of the pileus was at first light brown but became buff to ochraceous with age. The surface appeared covered with minute, dark buff scales. The margin was very definitely of lighter color than the rest of the cap. (See figure of pileus, Plate 8.)

The hymenium was dusty from the spores, but otherwise almost the same color as the cap, but slightly grayish, very soft and moist as in some Boleti. The tubes were large, angular to sinuous, nearly twice as long as broad, and later on appeared shallow and the pores lacerated. The tubes are longest towards the dome of the pileus, but become shallow towards the stem, almost resembling reticulations as they become decurrent.

The spores are hyaline, white in a mass, smooth, often narrow in the middle, but generally ovoid to ellipsoid, with one to several little oil globules. The average size is 10-17 μ by 4-7 μ .

The stem is solid, compound to branched, almost entirely below ground, rising from a solid sclerotium. Only about half an inch of the stem in our specimen showed the same color as the tubes, the rest was covered with soil particles firmly held. It was about 2½ inches long by ½ an inch thick. Length no doubt is determined by the depth the sclerotium is buried.

These notes have been taken from only one living specimen seen, and are as accurate as they could be made, but which of the characters referred to are permanent and specific, and which may vary, can only be determined from a series of specimens. It is interesting to record that while we may come across many references to sclerotia-bearing fungi in literature, yet the descriptions of any of those resembling our specimens are meager and indefinite.

Beginning, for instance, with Fries' *Pachyma cocos*, to which nearly all authors refer the term Tuckahoe, we cannot identify

our fungus as *Pachyma* in the absence of any fructifications known in his fungus; moreover our sclerotia were never white nor fleshy within.

The "native" or "black fellows" bread (3) of Australia and Tasmania (*Polyporus Mylittae* Mass.) also disagrees in description with our specimen. Then there is the specimen of Möller from southern Brazil, *Polyporus Sapurema*, with a sclerotium up to 40 lbs. in weight, apparently quite different from the Canadian specimen (4).

In Italy, "pietra fungaia," or the sclerotium of the fungus *Polyporus tuberaster* (Jacq.) Fries (5), seems to have received the most attention and excellent descriptions have been made. For a reference to the latest description of this fungus (6) we are greatly indebted to Professor Farlow, who with usual courtesy was good enough to copy for us the description therein given.

While our fungus is close to *P. tuberaster*, our sclerotia apparently differ very greatly from those of the former. The tubes in our form were never white, but yellowish from an early stage. The pores in our specimen are large and angular, in *P. tuberaster* small and round, though later becoming angular.

C. G. Lloyd (7), who speaks of specimens he has seen in Europe, states that *P. tuberaster* does not really have a true sclerotium. The hard masses are formed of earth, cemented into a stone-like body by the mycelium of the fungus. In this connection all descriptions of the sclerotia of *P. tuberaster* agree, but our sclerotia are quite different in structure and do not in any way resemble masses of earth cemented by fungus mycelium. We have occasionally observed masses of this description, some more like a sclerotium than others, but all of them altogether different from the Canadian Tuckahoe.

From a general survey of the forms to which this polypore may be referred, it would seem that the European *P. cristatus* Fr. bears considerable resemblance to it.

C. G. Lloyd, with usual candor, places himself on record as considering *P. cristatus* as probably identical with the American species *P. flavo-virens* Berk. et Rav., to which our form certainly comes very close.

Some authors are inclined to include *P. tuberaster* and *P. Sapurema* with *P. flavo-virens*.

At any rate we feel fairly confident in referring our fruiting body to the genus *Grifola* as revised by Murrill (8), since the generic characters agree satisfactorily.

The question of species is much more difficult; it would seem that the specific characters of this fungus do not agree with those of any of the species given by Murrill under *Grifola*. Later and more complete descriptions only, will settle some minor points. We regard our specimen as deserving specific rank, and in order to connect the Indian term Tuckahoe definitely with the fungus that has been grown from several of them, it is proposed to tentatively name it *Grifola Tuckahoe*, with the following brief diagnosis:

***Grifola Tuckahoe* sp. nov.**

Pileus fleshy, stipitate, lobed to imbricate, convex to plano-convex, 7–13 cm. (and more) in diameter, ochraceous to buff tawny, covered with minute dark scales on surface. Flesh soft, thick, light yellow to brown. Stipe central (to lateral), short, stout, compound. Tubes ochre to yellow brown, large, angular to sinuous, shallow and decurrent towards stipe, lacerate with age. Spores hyaline, guttulate, ovoid to ellipsoid, 4–7 μ by 10–17 μ , grayish-white in mass.

Habitat in poplar woods of Manitoba and Saskatchewan, growing from large coal-black rubber-like sclerotia, popularly known as Tuckahoe.

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EXPLANATION OF PLATES

Plate 7. Underground sclerotia of the Canadian Tuckahoe (*Grifolia Tuckahoe* Güssow). Left specimen showing groove resulting from attachment to root. Central specimen, portion of sectional sclerotium. The largest specimen shown weighed 8 lbs. 4 ozs.

Plate 8. Fruiting bodies growing from sclerotium of Tuckahoe.

Plate 9. *A*, Mycelial hyphae from interior of sclerotia showing hooks and clamp cells; *B*, structure of black substance of sclerotium showing size of the two mycelia present; *C*, spores of *Grifolia Tuckahoe*; *D*, germination from one to four days; *E*, pores of hymenium; *F*, diagram showing relative size of tubes to pileus.